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10/809,464	03/26/2004	Hirohito Okuda	500.43701X00	7643

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EXAMINER	
PARK, EDWARD	
ART UNIT	**PAPER NUMBER**
2624	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/809,464	OKUDA ET AL.	
	Examiner	Art Unit	
	EDWARD PARK	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *6/20/08*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6 and 26-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6 and 26-29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6/20/08 has been entered.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Specification

3. In response to applicant's amendment of the title, the previous title objection has been withdrawn.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary

skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. **Claims 1, 4, 5, 26, 27** are rejected under 35 U.S.C. 103(a) as being unpatentable over Ko et al (IEEE, "Solder Joints Inspection Using a Neural Network and Fuzzy Rule-Based Classification Method") in view of Kondo et al (US 5,852,470).

Regarding **claim 1**, Ko discloses a method for classifying defects, comprising:

obtaining an image of a defect on a sample ("three-color tiered illumination system … CCD camera"; Ko: pg. 94, right column, last paragraph);

extracting a characteristic of the defect from the image ("classify solder joints by color patterns obtained from a three-tiered color circular illumination system based upon a similarity measure between input data and the feature vectors of each class"; Ko: pg. 94, left column, third paragraph);

classifying the defect in accordance with the extracted characteristic, and based on a rule-based classification and a learning type classification (see pg. 94, left column, first paragraph);

calculating a set of first likelihoods of the defect belonging to each of a plurality of defect classes of the rule-based classification, by use of the extracted characteristic (see pg. 94, left column, first paragraph, unsupervised self organizing neural network such as either a learning vector quantization (LVQ) neural network which is inherently rule-based since no classification algorithm can not operate or execute without rule-based);

calculating a set of second likelihoods of the defect belonging to each of a plurality of defect classes of the learning type classification, by use of the extracted characteristic (see pg. 94, left

column, first paragraph, adaptive learning mechanism can automatically select the optimal number of clusters during a learning procedure);

calculating a third set of likelihoods of the defect belonging to each of the defect classes of the learning type classification, by the first and second likelihoods (see pg. 94, left column, first paragraph, after the learning procedure, a supervised learning method can then readjust the boundaries of classes like the supervised vector quantization algorithm); and

classifying the defect by use of the third likelihoods (see pg. 94, left column, first paragraph, able to readjust class boundaries with prior knowledge in the classification procedure). Ko does not disclose calculating a weighted average.

Kondo, in the same field of endeavor, teaches calculating a weighted average (see col. 25, lines 49-56; calculating the predicted values may be a learning method using a weighted average technique).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Ko reference to utilize weighted average as taught by Kondo, to derive predicted values in order for a highly accurate classification (see col. 25, lines 49-56, col. 26, lines 32-47).

Regarding **claim 4**, Ko further discloses wherein the plurality of classes of the rule-based classification are selected from class sets (Ko: pg. 94, left column, first paragraph) displayed on a display screen (Ko: pg. 94, right column, last paragraph).

Regarding **claim 5**, Ko further discloses the third likelihoods are calculated of by using a classification model comprising a relation of the classes of the learning type classification and the classes of the rule-based classification (see pg. 94, left column, first paragraph).

Regarding **claim 26**, Ko discloses an apparatus for classifying defects, comprising:

imaging means for obtaining an image of a defect on a sample ("three-color tiered illumination system … CCD camera"; Ko: pg. 94, right column, last paragraph);

means for extracting a characteristic of the defect from the image ("classify solder joints by color patterns obtained from a three-tiered color circular illumination system based upon a similarity measure between input data and the feature vectors of each class"; Ko: pg. 94, left column, third paragraph);

means for classifying the defect in accordance with the extracted characteristic, and based on a rule-based classification and a learning type classification (see pg. 94, left column, first paragraph), and

a display for displaying the image of the defect and the classification result on a screen (see pg. 94, right column, last paragraph);

wherein said classifying means comprises;

a rule-based classification apparatus for calculating a likelihoods of the defect belonging to each of plurality of rule classes by use of the characteristics of the defect (see pg. 94, left column, first paragraph, unsupervised self organizing neural network such as either a learning vector quantization (LVQ) neural network which is inherently rule-based since no classification algorithm can not operate or execute without rule-based),

a learning type classification apparatus for calculating a set of second likelihoods of the defect belonging to each of a plurality of defect classes by use of the characteristic of the defect (see pg. 94, left column, first paragraph, adaptive learning mechanism can automatically select the optimal number of clusters during a learning procedure), and

a classification model for calculating a set of third likelihoods of the defect belonging to each of said defect classes, by the first and second likelihoods (see pg. 94, left column, first paragraph, after the learning procedure, a supervised learning method can then readjust the boundaries of classes like the supervised vector quantization algorithm).

Kondo, in the same field of endeavor, teaches calculating a weighted average (see col. 25, lines 49-56; calculating the predicted values may be a learning method using a weighted average technique).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Ko reference to utilize weighted average as taught by Kondo, to derive predicted values in order for a highly accurate classification (see col. 25, lines 49-56, col. 26, lines 32-47).

Regarding **claim 27**, Ko further discloses displaying a plurality of class sets on the screen, for selection of said rule classes (see pg. 94, right column, last paragraph; left column, first paragraph).

6. **Claim 2** is rejected under 35 U.S.C. 103(a) as being unpatentable over Ko et al (IEEE, "Solder Joints Inspection Using a Neural Network and Fuzzy Rule-Based Classification Method") with Kondo et al (US 5,852,470), and further in view of Henry et al (IEEE/SEMI, "Application of ADC Techniques to Characterize Yield-Limiting Defects Identified with the Overlay E-test/Inspection Data on Short Loop Process Testers).

Regarding **claim 2**, Ko with Kondo discloses all elements as mentioned above in claim 1. Ko with Kondo does not disclose wherein the image is an SEM image.

Henry, in the same field of endeavor, teaches wherein the image is an SEM image ("SEM images"; Henry: section 3, first paragraph)

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Ko with Kondo combination to utilize an SEM image as taught by Henry, to allow for more detailed, enhanced images which would enhance the detection and classification of defects.

7. **Claim 3** is rejected under 35 U.S.C. 103(a) as being unpatentable over Ko et al (IEEE, "Solder Joints Inspection Using a Neural Network and Fuzzy Rule-Based Classification Method") with Kondo et al (US 5,852,470), and further in view of Kikuchi et al (US 6,801,650 B1).

Regarding **claim 3**, Ko with Kondo discloses all elements as mentioned above in claim 1. Ko with Kondo does not disclose defect image is obtained while the sample is positioned in accordance with position coordinate data of the defects on the sample.

Kikuchi, in the same field of endeavor, teaches defect image is obtained while the sample is positioned in accordance with position coordinate data of the defects on the sample. ("defective position coordinate … positions of defects on the semiconductor wafer"; Kikuchi: col. 17, lines 41-54).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Ko with Kondo combination to utilize position coordinate data of the defects on the sample as taught by Kikuchi, to allow the "area of the semiconductor wafer under inspection [to be] in the field of view of the objective lens" (Kikuchi: col. 17, lines 41-54).

8. **Claims 6, 28, 29** are rejected under 35 U.S.C. 103(a) as being unpatentable over Ko et al (IEEE, "Solder Joints Inspection Using a Neural Network and Fuzzy Rule-Based Classification Method") with Kondo et al (US 5,852,470), and further in view of Xu et al (IEEE, Methods of Combining Multiple Classifiers and Their Applications to Handwriting Recognition)

Regarding **claim 6**, Ko with Kondo discloses all elements as mentioned above in claim 5. Ko with Kondo does not disclose generating a plurality of classification models; determining a likelihood of the adequacy of each classification model; and deciding a class likelihood according to the determined model likelihood.

Xu, in the same field of endeavor, teaches a plurality of classification models; determining a likelihood of the adequacy of each classification model; and deciding a class likelihood according to the determined model likelihood (Xu: page 421, left column, lines 20-40).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Ko with Kondo combination to calculate the likelihood of each classification class as taught by Xu, to improve the performance and reliability of individual classifiers.

Regarding **claims 28, 29**, Ko with Kondo discloses all elements as mentioned above in claim 26. Ko with Kondo does not disclose a computing section for calculating a likelihood of the adequacy of each of a plurality of classification models and classifies the defects by using said likelihood of the adequacy of the classification models; a computing section for calculating said third likelihood and a model likelihood of the adequacy of the individual classification models to decide a class likelihood according to the model likelihood.

Xu, in the same field of endeavor, teaches a computing section for calculating a likelihood of the adequacy of each of a plurality of classification models and classifies the defects by using said likelihood of the adequacy of the classification models; a computing section for calculating said third likelihood and a model likelihood of the adequacy of the individual classification models to decide a class likelihood according to the model likelihood (Xu: page 421, left column, lines 20-40).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Ko with Kondo combination to calculate the likelihood of each classification class as taught by Xu, to improve the performance and reliability of individual classifiers.

Response to Arguments

9. Applicant's arguments filed 6/20/08, in regards to **claim 1**, have been fully considered but they are not persuasive. Applicant argues that in particular, Ko does not disclose calculating a third set of likelihoods of the defects belonging to each of the defect classes of the learning type classification by use of the first and second likelihoods; and classifying the defect based on the third likelihoods (see pg. 8, second paragraph). In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., calculating a third set of likelihoods of the defects belonging to each of the defect classes of the learning type classification by use of the first and second likelihoods) are not recited in the rejected claim(s). Although the claims are interpreted in light of the

specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Applicant argues that Ko does not appear to provide any disclosure for calculating a combination likelihood that utilizes the weighted average of two sets of likelihoods (see pg. 10, first paragraph). Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection. See above for newly established rejection for claim 1.

Furthermore, applicant argues that Ko fails to teach features of claim 1 such as: calculating a set of first likelihoods of the defect belonging to each of a plurality of defect classes of the rule-based classification, by use of the extracted characteristic; calculating a set of second likelihoods of the defects belonging to each of a plurality of defect classes of the learning type classification likelihood, by use of the extracted characteristic; calculating a third set of likelihoods of the defect belonging to each of the defect classes of the learning type classification, by calculating a weighted average of the first and second likelihoods; and classifying the defect by use of the third likelihoods (see pg. 10, first paragraph). This argument is not considered persuasive since the Ko with Kondo combination discloses all the limitations of claim 1, not the Ko reference alone. Examiner notes to see the above rejection for the newly amended rejection for the claim limitations of claim 1.

Regarding **claims 2-6**, applicant argues that the claims are allowable due to the dependency from claim 1 (see pg. 10, last paragraph). This argument is not considered persuasive since the rejection of claim 1 stands and the arguments and rejection of claim 1 can be seen above.

Regarding **claim 26**, applicant argues that Ko does not appear to disclose the features mentioned in claim 26 (see pg. 11, last paragraph). This argument is not considered persuasive since the Ko reference does not disclose all of the limitations of claim 26. It is the combination of Ko with Kondo that discloses all of the limitations mentioned in claim 26 and can be seen above in the rejection of the claim. Applicant's arguments with respect to claim 26 have been considered but are moot in view of the new ground(s) of rejection. Furthermore, the applicant argues that claim 26 is allowable for the same reasons/arguments as claim 1 (see pg. 11, last paragraph). This argument is not considered persuasive since claim 1 still stands and the arguments for claim 1 can be seen above.

Regarding **claims 27-29**, applicant argues that the claims are allowable due to the dependency from claim 26 (see pg. 12, third paragraph). This argument is not considered persuasive since the rejection of claim 26 stands and the arguments and rejection of claim 26 can be seen above.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to EDWARD PARK whose telephone number is (571)270-1576. The examiner can normally be reached on M-F 10:30 - 20:00, (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali can be reached on (571) 272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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